Australian Journal of Taxonomy
Open-access, online, rapid taxonomy
https://doi.org/10.54102/ajt

A new species of open-holed trapdoor spider of the genus *Proshermacha* (Mygalomorphae: Anamidae) from Western Australia

Xavier J. R. Leenders[1,2,3], Donna Beach[3] & Mark S. Harvey[2,4]

[1]School of Media, Creative Arts and Social Inquiry, Curtin University, Bentley, Western Australia 6102, Australia.
[2]Collections & Research, Western Australian Museum, 49 Kew Street, Welshpool, Western Australia 6106, Australia.
[3]Esperance Tjaltjraak Native Title Aboriginal Corporation, 11A Shelden Rd, Chadwick WA 6450, Australia.
[4]Adjunct, School of Biological Sciences, University of Western Australia, Crawley, Western Australia 6009, Australia.
Corresponding author: xavier.leenders@postgrad.curtin.edu.au
Xavier Leenders https://orcid.org/0000-0002-9229-0046; Mark Harvey https://orcid.org/0000-0003-1482-0109.

© Copyright of this paper is retained by its authors, who, unless otherwise indicated, license its content under a CC BY 4.0 license

Abstract

The open-holed trapdoor spider genus *Proshermacha* Simon, 1908 occurs across southern Australia and currently comprises ten named species although most are poorly diagnosed. We describe a new species, *Proshermacha wilga*, from southern Western Australia from adult males and adult females, which is supported by a multi-gene molecular analysis.

Cite this paper as: Leenders XJR, Beach D & Harvey MS (2023). A new species of open-holed trapdoor spider of the genus *Proshermacha* (Mygalomorphae: Anamidae) from Western Australia. *Australian Journal of Taxonomy* 20: 1–10. doi: https://doi.org/10.54102/ajt.vyjry

ZooBank Registration: https://zoobank.org/References/985AB4F4-7E52-4383-9C70-7039A884306A

Introduction

The open-holed trapdoor spiders of the genus *Proshermacha* Simon, 1908 include several named species that are endemic to Australia, whose range is thought to extend from Western Australia's south-west region, into southern South Australia and western Victoria. Although most species appear to prefer mesic habitats across their range, including the Western Australian IBRA bioregions Swan Coastal Plain, Jarrah Forest, Karri Forest, Eucalypt and Mallee Woodlands, and a number are also known to inhabit arid and semi-arid habitats (Harvey et al. 2018).

Having been resurrected by Harvey et al. (2018), *Proshermacha* is currently poorly documented and in need of revisional studies. Only ten species of the genus have been previously described although numerous undescribed species are present in Australian specimen collections (Harvey et al. 2018). Seven of the ten species feature descriptions based solely on female specimens (Hogg 1901; Main 1954; Rainbow and Pulleine 1918; Simon 1908) and moreover, the type species of the genus, *P. subarmata* Simon, 1908, is only known from a juvenile specimen.

This paper describes a new species of *Proshermacha* from the Western Australian Esperance Plains and

This paper was submitted on 4 February 2023 and published on 27 May 2023 (2023-05-26T20:56:35.241Z). It was reviewed by Jess Marsh and an anonymous reviewer, and edited by Kevin Thiele. Mark Harvey is an Editor of the Australian Journal of Taxonomy. He did not at any stage have access to the manuscript while in peer review, and had no influence on its acceptance or handling, as is standard practice for manuscripts submitted by editors. Australian Journal of Taxonomy. ISSN: 2653-4649 (Online).

Mallee bioregions: *Proshermacha wilga* sp. nov. The species is currently represented by 22 specimens held at the Western Australian Museum, most of which have been collected from around the Ravensthorpe Range. Molecular data are used to demonstrate that the new species represents a taxon that is distinct from other putative new species, but also from *P. villosa* (Rainbow and Pulleine 1918), which is newly characterised with COI data derived from freshly collected specimens from the type locality, Carlotta Brook.

As explained by Wilson et al. (2023), we are confident that *P. credo* sp. nov. is not conspecific with any previously named species as its known range is does not overlap with the old type localities which are situated at least 450 away. We are aware of numerous new species in the intervening areas that show progressive patterns of species replacement, such that widely distributed, disjunct species are unknown.

Methods

This study examined specimens lodged in the Western Australian Museum (WAM) with the specimens stored in 70% ethanol. This taxon was previously provided the designation *Proshermacha* sp. MYG346, with all specimens collected from the Esperance Plains or Mallee IBRA bioregions (Thackway and Cresswell 1995; Department of the Environment 2013; Figure 1). The specimens were examined following the taxonomic methodology laid out by Huey et al. (2019), under a Leica MZ16A dissecting microscope. Digital images were taken using a Leica DFC500 camera attached to a Leica MZ16A microscope, and processed using Leica Application Suite (LAS) version 2.5.OR1 software. All measurements are in millimetres (to two decimal points), with body length measurements made in dorsal view. Leg I measurements were made along the dorsal edge of each segment, in prolateral view. Scanning electron microscopy was also conducted on a paratype specimen using a TM3030 Plus Tabletop Microscope. The speciment was dried, placed on electrically conductive double-sided adhesive tape, and sputter-coated with gold prior to imaging.

The following abbreviations are used throughout the text: ALE, anterior lateral eye/s; AME, anterior median eye/s; IBRA, Interim Biogeographic Regionalisation of Australia Version 7 (online at https://www.environment.gov.au/land/nrs/science/ibra); PLE, posterior lateral eye/s; PLS, posterior lateral spinneret/s; PME, posterior median eye/s; PMS, posterior median spinneret/s. The following abbreviations are used in species descriptions, and refer to taxonomically informative measurements of the male leg I, following Castalanelli et al (2020): TIL, tibia I length; TID, tibia I depth (or width); TIS, tibia I length from base to distal face of spur; TISH, height of tibia spur (excluding megaspine); MIL, metatarsus I length; MID, metatarsus I depth (or width).

Molecular methods

Fragments of two mitochondrial and four nuclear genes were Sanger sequenced for this study: cytochrome *c* oxidase subunit I (COI), 16S ribosomal RNA (16S), histone H3 (H3), 18S ribosomal RNA (18S), 28S ribosomal RNA (28S), and elongation factor 1-gamma (EF-1γ), as utilised in previous studies on Anamidae (e.g. Harvey et al. 2018; Rix et al. 2021). The mitochondrial ribosomal RNA 12S was excluded as it rarely amplified for species of *Proshermacha* (Harvey et al. 2018). The dataset (Table 1) includes previously published sequences derived from Harvey et al. (2018) and some new sequence data including the first sequence data for *P. villosa* (Rainbow & Pulleine, 1918). All sequences are available via GenBank. The methods used for DNA extraction, polymerase chain reaction, nucleotide Sanger sequencing and sequence editing followed the methodology outlined by Harvey et al. (2018). The final molecular dataset (Table 1) comprised 13 representative specimens here described as *Proshermacha wilga*, 15 additional specimens representing 13 currently undescribed species of *Proshermacha,* two specimens of *Proshermacha villosa* (Rainbow and Pulleine, 1918), and *Aname mellosa* Harvey, Framenau, Wojcieszek, Rix & Harvey, 2012. A specimen of *Stanwellia nebulosa* (Rainbow and Pulleine, 1918) was set as the ultimate outgroup. Alignments were carried out using the MAFFT plug-in in Geneious (Katoh and Standley 2013). The sequences were concatenated using the default settings in Geneious. A Bayesian phylogenetic analysis of the dataset was conducted using MrBayes Version 3.2.6 (Huelsenbeck & Ronquist 2001; Ronquist and Huelsenbeck 2003), via the CIPRES Science Gateway (Miller et al. 2010). A generalized substitution model was employed. Four Markov Chain Monte Carlo (MCMC) chains were run for 100 million generations, with the first 10% of sampled trees discarded as 'burn-in'. The output 50% majority-rule consensus tree and posterior probabilities for each node were visualized in FigTree Version 1.4.4.

Discussion

The molecular analysis recovered *Proshermacha wilga* sp. nov., newly described here, within a clade containing other species of *Proshermacha* (Figure 2). Specimens of the new species formed a genetically homogenous lineage distinct from other described and undescribed species of *Proshermacha.* All specimens of *Proshermacha wilga* sp. nov. recorded in the analysis presented a maximum pairwise genetic COI divergence of 5.32%, while presenting a minimum divergence of 11.09% and 12.16% from *Proshermacha* sp. MYG464 and *Proshermacha* sp. MYG344 respectively. The divergence between the Ravensthorpe populations and the Esperance specimen (WAM T78550) (ca. 180 km apart) was 4.86–5.32%, and the divergence within the Ravensthorpe population was 0.30–2.13%.

Table 1. Samples and GenBank sequence accession numbers

Taxon	Registration number	COI	18S	28S	EF1-γ	Histone 3	16S
Family Pycnothelidae							
Stanwellia nebulosa (Rainbow & Pulleine, 1918)	SAM NN28449	MG800141	MG799988	MG800065	MG800189	–	MG799919
Family Anamidae							
Aname mellosa Harvey et al., 2012	WAM T107182	KJ744651	MG800030	MG800107	MG800231	MG800294	MG799958
Proshermacha villosa (Rainbow & Pulleine, 1918)	WAM T146686	OQ918548	OQ919015	OQ919003	–	OQ918668	OQ919025
Proshermacha villosa (Rainbow & Pulleine, 1918)	WAM T146688	OQ918549	OQ919016	OQ919004	–	OQ918669	OQ919026
Proshermacha wilga sp. nov.	WAM T64919	KJ745218	OQ919008	OQ919005	–	OQ918660	OQ919018
Proshermacha wilga sp. nov.	WAM T65204	KJ745219	MG799998	MG800075	MG800195	MG800270	MG799927
Proshermacha wilga sp. nov.	WAM T78550	KJ745284	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T80940	OQ918550	OQ919012	OQ919006	–	OQ918664	OQ919019
Proshermacha wilga sp. nov.	WAM T80952	MG800150	MG800010	MG800087	MG800209	MG800275	MG799939
Proshermacha wilga sp. nov.	WAM T81022	OQ918551	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T81277	OQ918552	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T88469	KJ745300	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T132271	OQ918553	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T132277	OQ918554	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T132303	OQ918555	–	–	–	–	–
Proshermacha wilga sp. nov.	WAM T132500	OQ918556	–	–	–	–	–
Proshermacha sp. MYG344	WAM T57576	KJ745211	OQ919007	OQ918997	–	OQ918659	OQ919017
Proshermacha sp. MYG344	WAM T132981	MG800181	MG800054	MG800132	MG800251	MG800311	MG799978
Proshermacha sp. MYG349	WAM T72701	KJ745222	MG799999	MG800076	MG800197	–	MG799928
Proshermacha sp. MYG357	WAM T78522	KJ745275	OQ919010	OQ918998	–	OQ918662	OQ919020
Proshermacha sp. MYG357	WAM T78535	KY241279	KY241248	KY241263	MG800206	KY241285	KY241232
Proshermacha sp. MYG357	WAM T78564	KJ745285	OQ919011	OQ918999	–	OQ918663	OQ919021
Proshermacha sp. MYG362	WAM T81483	KJ745286	OQ919013	OQ919000	–	OQ918665	OQ919022
Proshermacha sp. MYG429	WAM T96060	MG800158	OQ919014	OQ919001	OQ944936	OQ918666	OQ919023
Proshermacha sp. MYG435	WAM T114998	MG800163	MG800033	MG800110	MG800234	MG800296	MG799960
Proshermacha sp. MYG464	WAM T85757	MG800154	MG800014	MG800091	–	MG800279	MG799943
Proshermacha sp. MYG465	WAM T78507	KJ45268	OQ919009	OQ919002	–	OQ918661	OQ919024
Proshermacha sp. MYG465	WAM T132960	MG800180	MG800053	MG800131	–	–	MG799977
Proshermacha sp. MYG466	WAM T81370	MG800153	MG800013	MG800090	MG800212	MG800278	MG799942
Proshermacha sp. MYG467	WAM T131982	MG800169	MG800041	MG800119	MG800242	OQ918667	MG799966
Proshermacha sp. MYG469	WAM T94765	MG800156	MG800016	MG800093	MG800214	MG800281	MG799945
Proshermacha sp. MYG470	WAM T134205	–	MG800057	MG800135	MG800255	–	MG799980
Proshermacha sp. MYG471	WAM T132903	–	MG800050	MG800128	–	MG800309	MG799974

In addition to sequence data from several unnamed species of *Proshermacha*, we also provide new sequence data from two specimens collected from Carlotta Brook and Roberts Road, Carlotta that we identify as *P. villosa*, which was originally described from a single female with young from Carlotta Brook (Rainbow and Pulleine 1918). The COI data suggests a relationship with *P.* sp. MYG465 from Albany and Torndirrup National Park rather than with *P. wilga*.

Taxonomy

Family Anamidae Simon, 1889

Subfamily Teylinae Main, 1985

Genus *Proshermacha* Simon, 1908

Proshermacha Simon, 1908: 363

Type species: *Proshermacha subarmata* Simon, 1908, by subsequent designation of Rainbow (1911).

Species of *Proshermacha* can be distinguished from other Anamidae by a number of characteristics, outlined by Harvey et al. (2018) and Harvey et al. (2020). As a member of Teylinae, *Proshermacha* differs from Anaminae (genera *Aname* L. Koch, 1873, *Hesperonatalius* Castalanelli, Huey, Hillyer & Harvey, 2017, *Kwonkan* Main, 1983, *Swolnpes* Main & Framenau, 2009 and *Troglodiplura* Main, 1969) by the long pedipalpal tarsus which is medially constricted in lateral view (Figures 13, 15). Unlike *Chenistonia* Hogg, 1901, *Proshermacha* males feature a long embolus (Figures 13–15). It differs from *Teyl* Main, 1975, *Teyloides* Main, 1983 and *Namea* Raven, 1984 by the elongated embolus arising from the distal

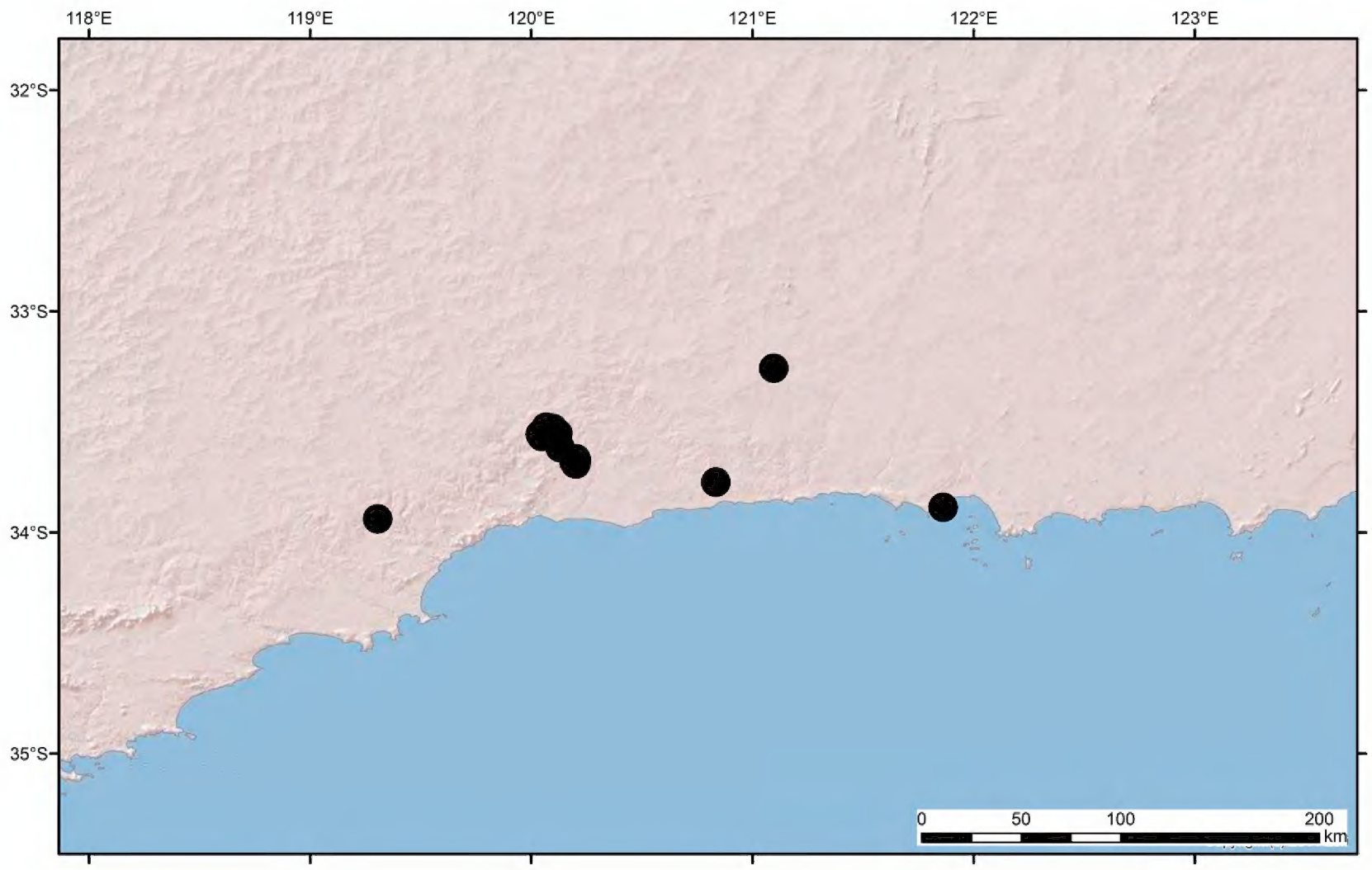


Figure 1. Map showing known WAM collection records of *Proshermacha wilga* sp. nov.

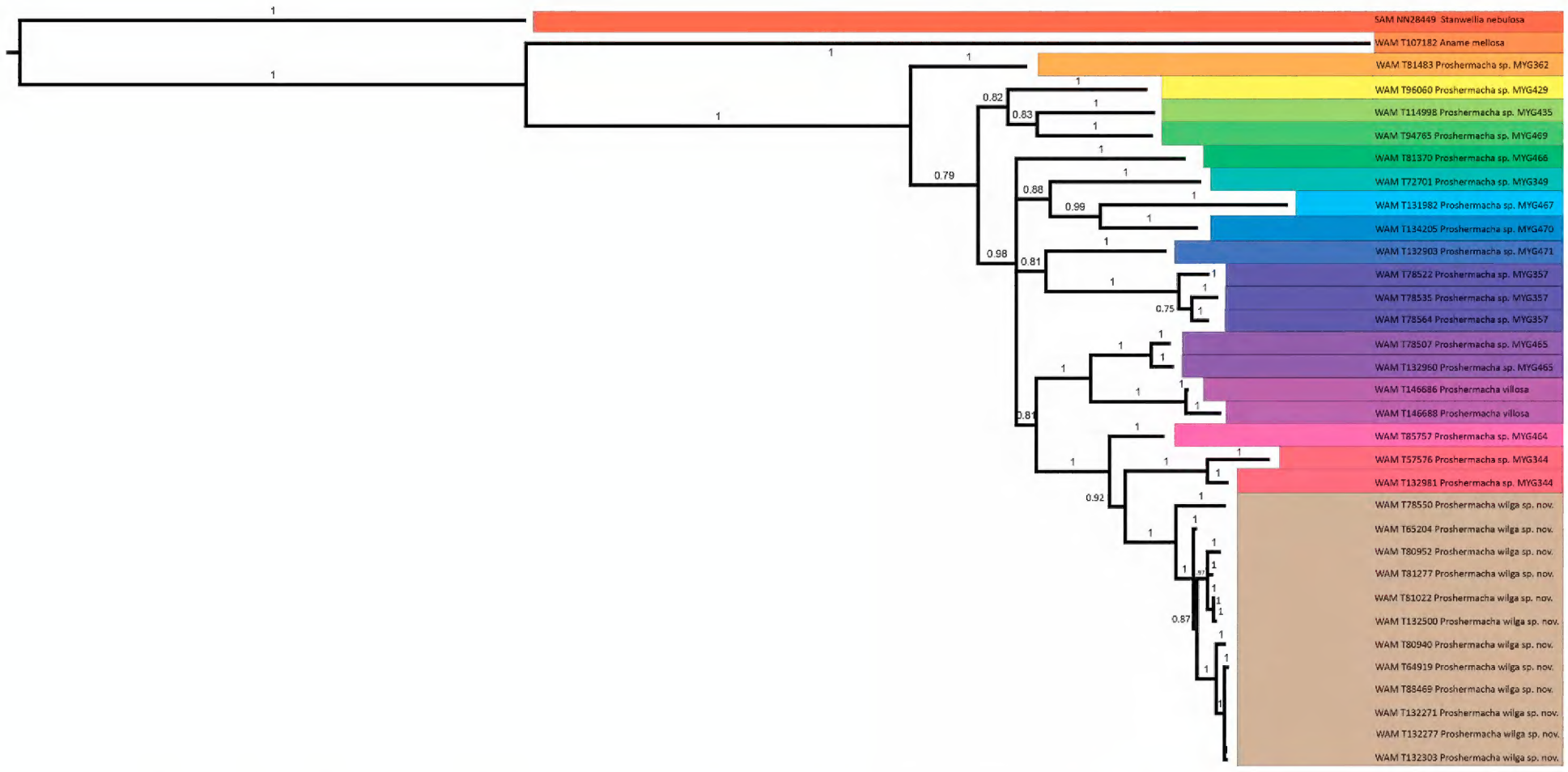

SAM NN28449 Stanwellia nebulosa
WAM T107182 Aname mellosa
WAM T81483 Proshermacha sp. MYG362
WAM T96060 Proshermacha sp. MYG429
WAM T114998 Proshermacha sp. MYG435
WAM T94765 Proshermacha sp. MYG469
WAM T81370 Proshermacha sp. MYG466
WAM T72701 Proshermacha sp. MYG349
WAM T131982 Proshermacha sp. MYG467
WAM T134205 Proshermacha sp. MYG470
WAM T132903 Proshermacha sp. MYG471
WAM T78522 Proshermacha sp. MYG357
WAM T78535 Proshermacha sp. MYG357
WAM T78564 Proshermacha sp. MYG357
WAM T78507 Proshermacha sp. MYG465
WAM T132960 Proshermacha sp. MYG465
WAM T146686 Proshermacha villosa
WAM T146688 Proshermacha villosa
WAM T85757 Proshermacha sp. MYG464
WAM T57576 Proshermacha sp. MYG344
WAM T132981 Proshermacha sp. MYG344
WAM T78550 Proshermacha wilga sp. nov.
WAM T65204 Proshermacha wilga sp. nov.
WAM T80952 Proshermacha wilga sp. nov.
WAM T81277 Proshermacha wilga sp. nov.
WAM T81022 Proshermacha wilga sp. nov.
WAM T132500 Proshermacha wilga sp. nov.
WAM T80940 Proshermacha wilga sp. nov.
WAM T64919 Proshermacha wilga sp. nov.
WAM T88469 Proshermacha wilga sp. nov.
WAM T132271 Proshermacha wilga sp. nov.
WAM T132277 Proshermacha wilga sp. nov.
WAM T132303 Proshermacha wilga sp. nov.

Figure 2. Maximum Likelihood tree of the molecular dataset (Table 1), showing the phylogenetic position of *Proshermacha wilga* sp. nov. in relation to other *Proshermacha*, and other lineages of Anamidae.

end of the pedipalpal bulb (Figures 12–15) or lacking a bulbous projection on metatarsus I (Figure 16).

Remarks: Whilst previously considered a junior synonym of *Aname* or *Chenistonia* (Main 1982, 1985, 2012; Raven 1981, 1984, 1985, 2000), Harvey et al. (2018) drew primarily on consistent differences in embolus length and the shape of the pedipalpal tibia in males to support the clade as morphologically distinct, resurrecting *Proshermacha* and removing all species from the synonymy of *C. tepperi* (Hogg, 1902) [originally described from southern South Australia, see Hogg (1902)], until

species-level revisions could be undertaken. In addition, the authors noted that many species now attributed to *Proshermacha,* including the type species (*Proshermacha subarmata* Simon 1908), those described by Hogg (1902), Simon (1908), Rainbow & Pulleine (1918) and Main (1954), and those included in *Chenistonia* by Main (1982, 1985, 2012), are provisional and await confirmation in revisionary studies. Indeed, all of the previously named species are poorly described and most lack detailed illustrations of characters of taxonomic importance including the male pedipalp and female spermathecae. The only published genitalic illustrations are the spermathecae of the holotype of *P. armigera* (Rainbow and Pulleine, 1918) (Harvey et al. 2020, fig. 156), the male and female of an undescribed species, *P.* sp. MYG357 from south-western Australia (Harvey et al. 2018, fig. 7), and the male and female of *P. credo* (Wilson et al. 2023). Our decision to describe and name a new species from Western Australia's south coast is confounded by the lack of knowledge of most previously described species. However, as all species of *Proshermacha* are short-range endemic species (Harvey et al. 2018; MSH, unpublished data), and the type localities of all other *Proshermacha* species are not located near the distribution of *P. wilga*, we see no impediment to naming this species. Incidentally, we provide evidence using molecular sequence data to demonstrate that the new species is not conspecific with one of the previously described species, *P. villosa* (Rainbow and Pulleine, 1918).

Distribution

Species of *Proshermacha* are known to inhabit the southern region of South Australia, western Victoria and the south-western region of Western Australia within mesic, semi-arid, and arid habitats.

Included species

The genus *Proshermacha* currently includes 11 described species, including the species newly described here. Morphological features (notably in the first leg and male pedipalp) and molecular data (Harvey et al. 2018) confirm that *Proshermacha* features significant species-level diversity. A significant number of undescribed species are known to inhabit South Australia and Western Australia.

Proshermacha wilga Leenders, Beach & Harvey, sp. nov.

ZooBank Registration: https://zoobank.org/NomenclaturalActs/8276A188-C510-4509-B78F-74CCF24A94B5

Type specimens

Holotype

AUSTRALIA: *Western Australia*: ♂, Kundip, 17.2 km SE. of Ravensthorpe, site KU6, 33°40'28"S, 120°11'49"E, dry pitfall trap, 1 January 2004, R. Teale (WAM T64919).

Paratypes

AUSTRALIA: *Western Australia*: 1 ♀, Kundip, 17.2 km SE. of Ravensthorpe, 33°40'23.60"S, 120°12'14.40"E, ex burrow amongst eucalypt bushland opening over opening *Acacia* and *Triodia* grassland, 4 December 2014, M. Greenham, R. Teale (WAM T132277); 1 ♂, Kundip, 17.2 km SE. of Ravensthorpe, 33°40'04"S, 120°12'07"E, pitfall trap, 6 January 2004, R. Teale (WAM T64920); 3 ♂, Kundip, 18.3 km SE. of Ravensthorpe, 33°41'20"S, 120°11'54"E, pitfall trap, 5 January 2004, R. Teale (WAM T65203, T65204, T65213); 1 ♂, same data except 11 January 2004, R. Teale, G. Harold (WAM T88469); 2 ♂, same data except 13 January 2004, R. Teale, G. Harold (WAM T88464, T88466); 1 juvenile, Kundip, 17.7 km SE. of Ravensthorpe, 33°40'23.41"S, 120°12'13.47"E, ex burrow, 4 December 2013, M. Greenham, R. Teale (WAM T132271); 1 ♀, Kundip, 18.7 km SE. of Ravensthorpe, 33°41'23.67"S, 120°12'09.17"E, ex burrow, 6 December 2013, M. Greenham, R. Teale (WAM T132303).

Diagnosis

Males of *Proshermacha wilga* sp. nov., can be tentatively distinguished from males attributed to *P. tepperi* (based on drawings in Main 1964, 1976) by the tibia of leg I, which is thinner (Figures 17, 18) and the metatarsus of leg I by the lack of a ventral mound (Figure 19). They can be distinguished from *P. credo* by possessing a thicker tibia and metatarsus of leg I and a less porrect tibial megaspur (Figures 17–19). Males are currently unknown for all other described species of *Proshermacha*. Females of *Proshermacha wilga* sp. nov. can be distinguished from *P. armigera* and *P. credo* by their spermathecae, which are strongly medially curved (Figure 29) such that they form a 90° angle. Females differ from *P. cuspidata* (Main, 1954) by the conformation of the maxillary cuspules which are more numerous in *P. cuspidata* (ca. 160 cuspules) than in *P. wilga* (83–89 cuspules; Figure 30). Females of *P. wilga* cannot currently be distinguished from other species of *Proshermacha* for which adequate diagnoses, descriptions and images are not yet available.

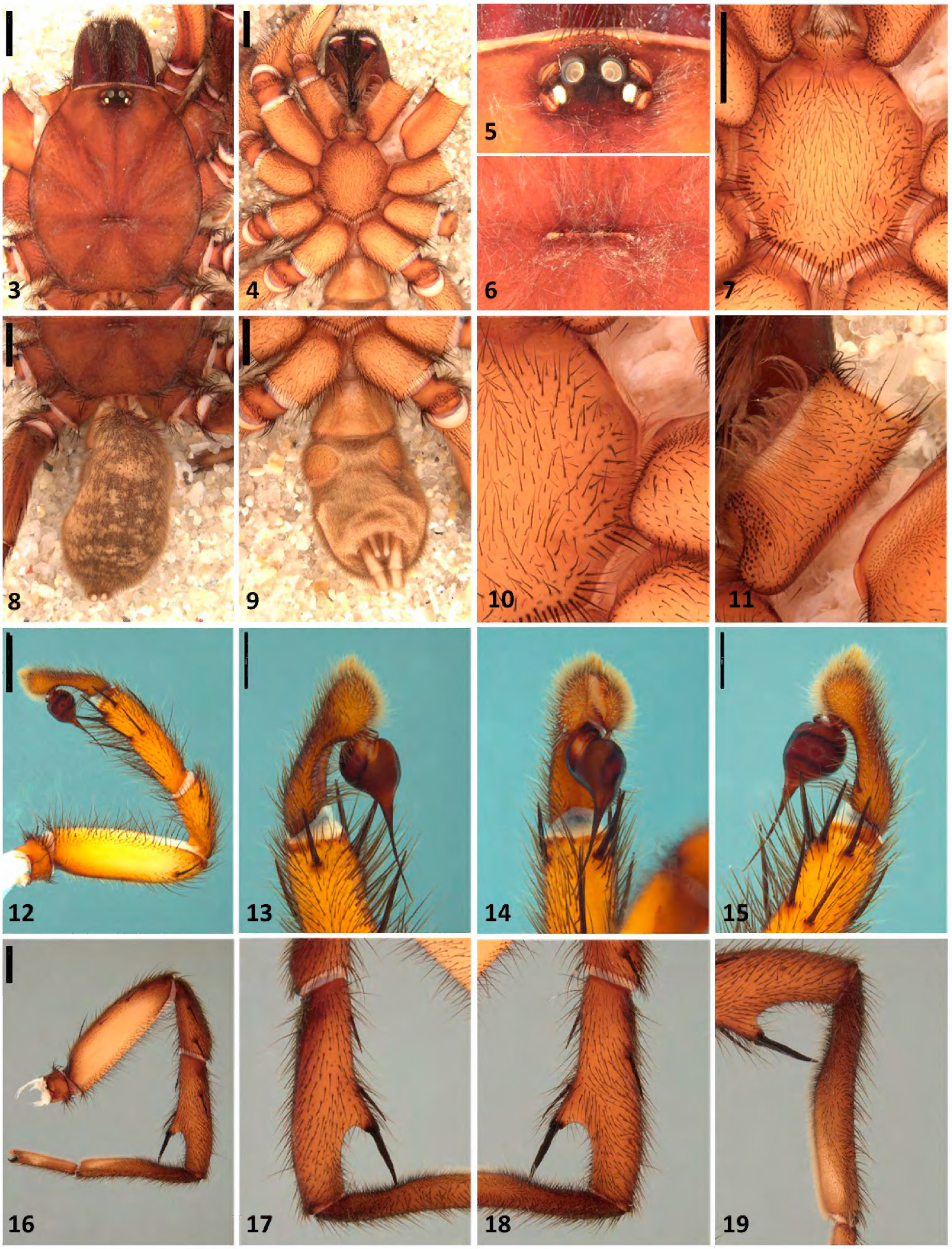
Description

Male: based on holotype (WAM T64919) (Figures 3–19, 30–33)

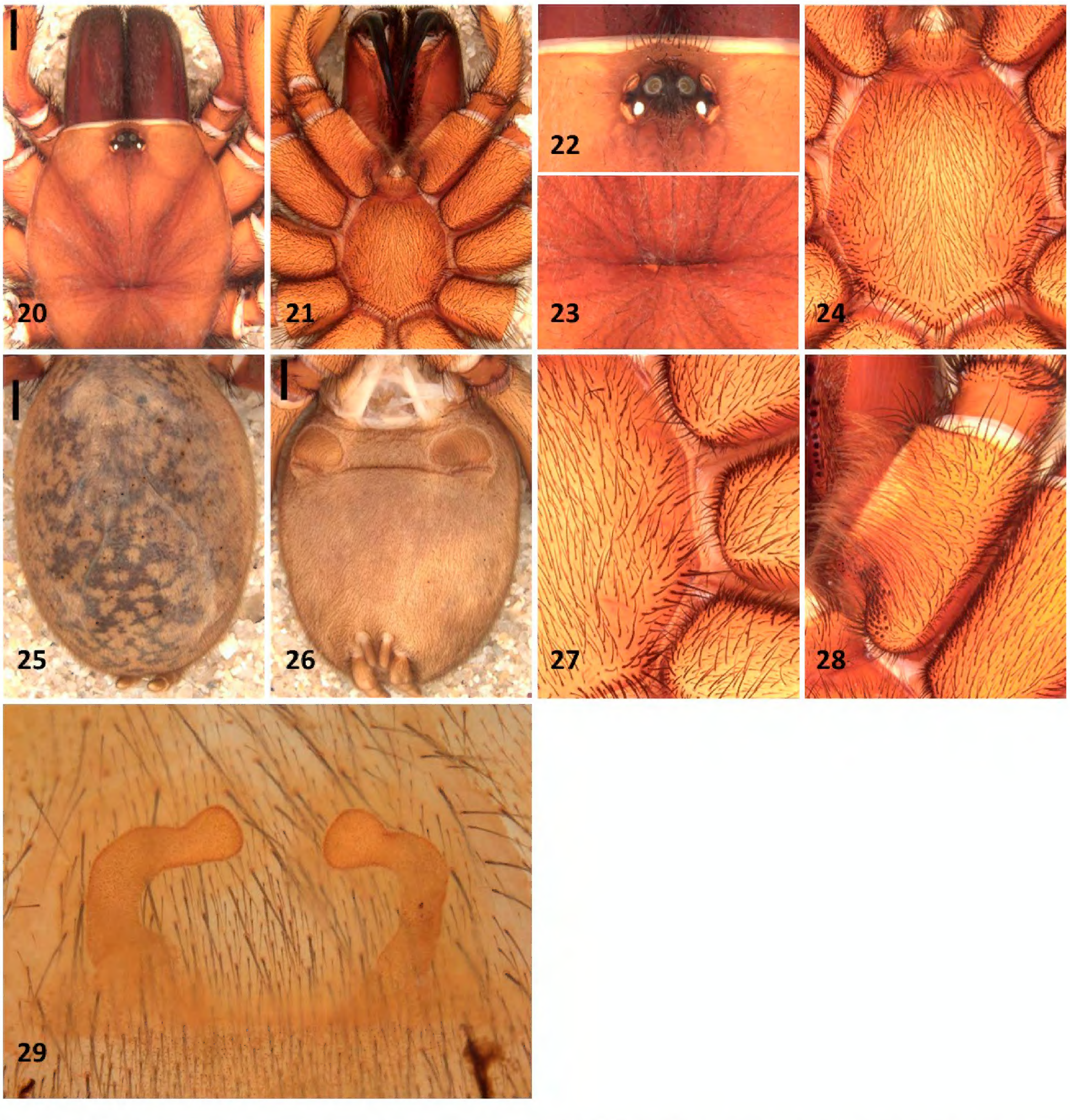
Body length (with chelicerae but excluding spinnerets) 21.21; body length (without chelicerae or spinnerets) 18.47. Carapace length 9.39, width 7.84. Sternum length 4.05, width 4.4. Abdomen length 8.45, width 4.66.

Carapace (Figure 3): 1.21 × longer than broad; uniformly deep brown except for darker radial markings; larger setae around margin, silver hairs present; without dorsal bristles; clypeal edge slightly convex; fovea (Figure 6) very slightly recurved.

Eye group (Figure 5): on distinct mound; 0.90 long and 1.50 wide; anterior eye row nearly straight from above,



Figures 3-19. *Proshermacha wilga* sp. nov., male holotype (WAM T64919); 3) cephalothorax, dorsal view; 4) cephalothorax, ventral view; 5) ocular region; 6) Fovea; 7) sternum, ventral view; 8) abdomen, dorsal view; 9) abdomen, ventral view; 10) left sigilla, ventral view; 11) left maxilla; 12) right pedipalp, prolateral view; 13) right pedipalp, tibia and tarsus, prolateral view; 14) right pedipalp, tibia and tarsus, ventral view; 15) right pedipalp, tibia and tarsus, prolateral view; 16) left leg I, prolateral view; 17) left tibia I, retrolateral view; 18) left tibia I, prolateral view; 19) left metatarsus I, prolateral view. Scale lines = 2 mm.



Figures 20-29. *Proshermacha wilga* sp. nov., female paratype (WAM T132277); 20) cephalothorax, dorsal view; 21) cephalothorax, ventral view; 22) ocular region; 23) fovea; 24) sternum, ventral view; 25) abdomen, dorsal view; 26) abdomen, ventral view; 27) left sigilla, ventral view; 28) left maxillae; 29) spermathecae, dorsal view. Scale lines = 2 mm.

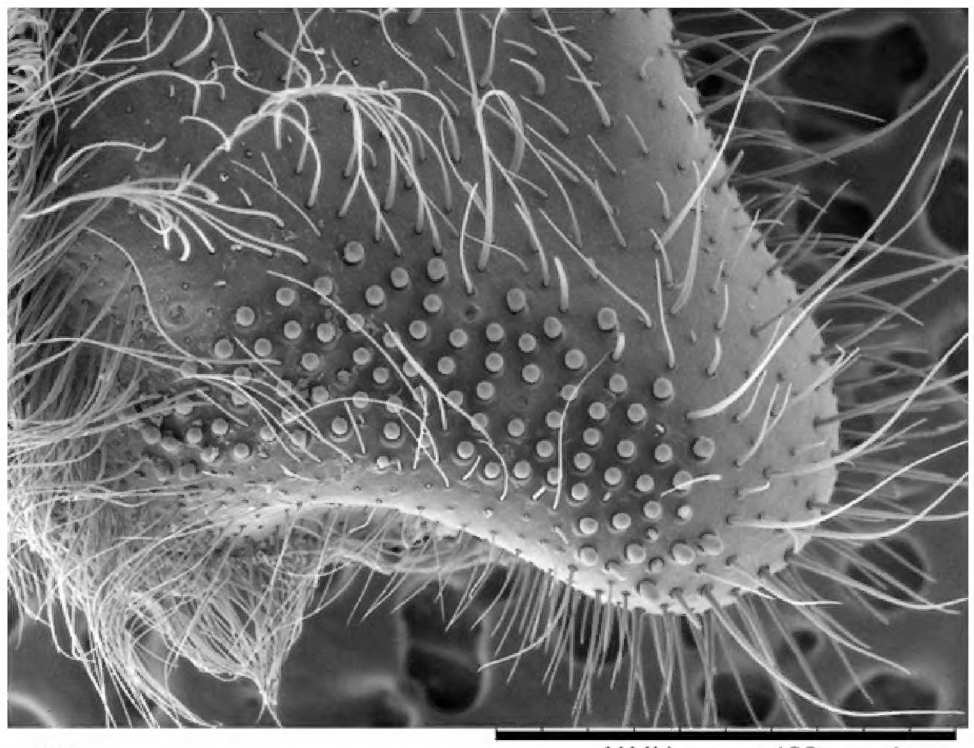
posterior eye row recurved; AME slightly larger than PME, ALE and AME the largest, PME smallest.

Chelicerae (Figures 3–4)*:* uniformly dark red-brown with broad dorsal strip of black setae and two thinner lateral strips of smaller black setae; rastellum absent; promargin of tooth row with 8 small teeth; retromargin with 8 teeth.

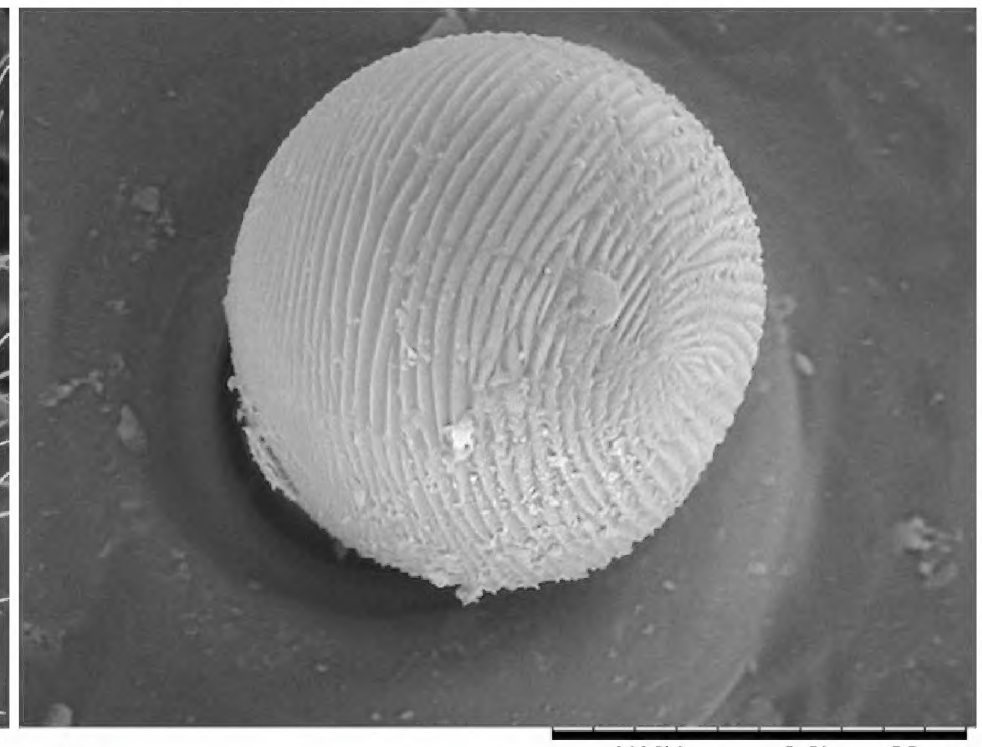
Maxillae (Figure 11): about same colour as coxae I–IV; with 83 cuspules on the right and 76 on the left, all located on basal edge.

Sternum (Figure 7): ovoid and posteriorly pointed; 1.09 × longer than broad; with bristles on posterior margin and with setae covering entire surface. Three pairs of sigilla (Figure 10), each pair increasing in size from anterior to posterior; anterior and median pairs located near edge of sternum and posterior pair elongate. Labium (Figure 7) fused to sternum and without cuspules.

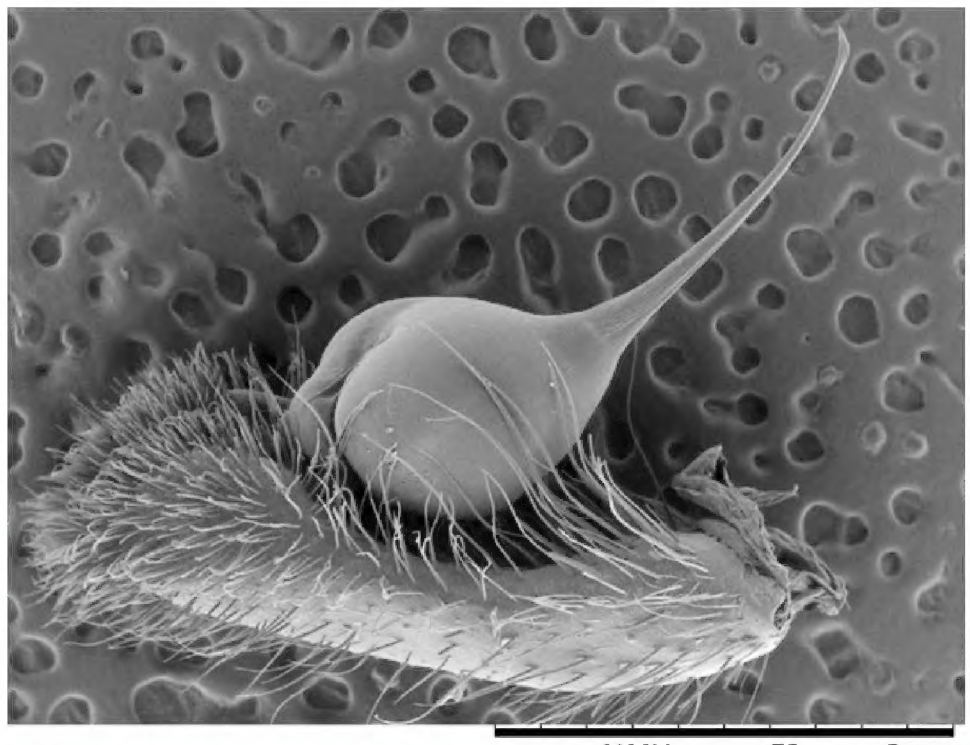
Abdomen (Figures 8–9): dorsally pale creamy-yellow with grey-brown markings, and ventrally pale creamy-yellow; 1.81 × longer than broad; densely pilose and with long setae on dorsal side. Two pairs of spinnerets; PMS unsegmented and separated by about the diameter of a



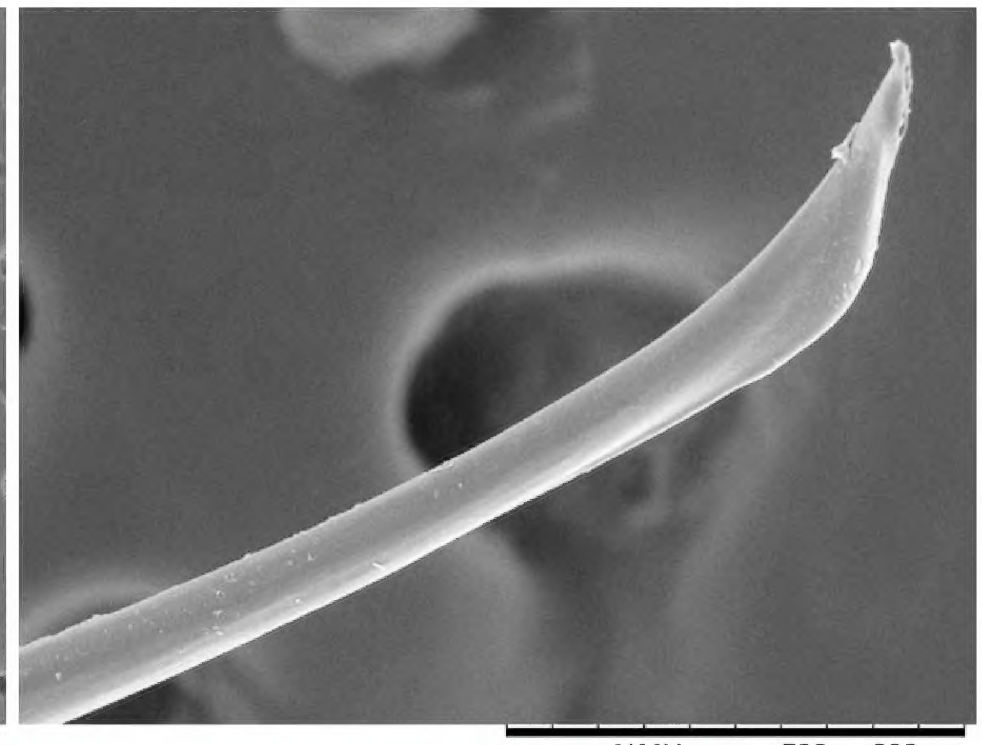
30



31



32



33

Figures 30-33. *Proshermacha wilga* sp. nov., male paratype (WAM T88464) scanning electron microscopy images: 30) left maxilla; 31) cuspule on left maxilla; 32) pedipalp, tarsus and bulb; 33) pedipalp, embolus tip.

spinneret; PLS 3-segmented and digitiform, with apical segment elongate.

Legs (Figures 16–19): generally light brown, femora I and II yellow, especially on prolateral face; prolateral face yellow-brown, other leg segments dark. Coxal cuspules absent. Tibia I cylindrical and with large megaspur; TIL/TID 4.33; TIS/TIL 0.68; TISH/TID 0.68; metatarsus slightly incrassate; MIL/MID 6.64; MIPEL/MIL 0.51; scopula present on all tarsi, and present distally on metatarsi I–III; tibia with numerous trichobothria in 2 rows, metatarsi with several trichobothria, tarsi with numerous trichobothria; claws with 2 rows of teeth; claw tufts absent. Dimensions (mm): Femur I 8.37/2.59, L/W 3.23; tibia I 6.47; metatarsus I 6.93; femur IV 8.1/1.89; L/W 4.29.

Pedipalp (Figures 12–15): tibia cylindrical, narrow; asetose depression absent; tarsus long, with medial constriction when viewed laterally; tarsus densely setose; bulb ovoid; embolus longer than bulb, slender, slightly curved, tip slightly broadened.

Female: based on paratype (WAM T132277) (Figures 20–29)

Body length (with chelicerae, but excluding spinnerets) 26.82; body length (without chelicerae or spinnerets) 23.09. Carapace length 10.85, width 8.55. Sternum length 5.97, width 4.36. Abdomen length 12.59, width 9.45.

Carapace (Figure 20): 1.28 × longer than broad; uniformly deep brown, except for darker radial markings; larger setae around margin; silver hairs present; without dorsal bristles; clypeal edge slightly convex; fovea (Figure 23) very slightly recurved.

Eye group (Figure 22): on distinct mound; 1.03 long, 1.58 wide; anterior eye row nearly straight from above, posterior eye row recurved; AME slightly larger than PME; ALE and AME the largest; PME smallest.

Chelicerae (Figures 20-21): uniformly dark red-brown with broad dorsal strip of black setae and two thinner lateral strips of smaller black setae; rastellum absent;

promargin of tooth row with 8 teeth. 13 small teeth; retromargin with 13 teeth.

Maxillae (Figure 28): about same colour as coxae I–IV with 83 cuspules on the right and 89 on the left, all located on the basal edge.

Sternum (Figure 24): ovoid and posteriorly pointed; 1.36 × longer than broad; with bristles on posterior margin and with setae covering entire surface. Three pairs of sigilla (Figure 27), each pair increasing in size from anterior to posterior; anterior and median pairs located near edge of sternum and posterior pair elongate. Labium (Figure 24) fused to sternum and without cuspules.

Abdomen (Figures 25–26): dorsally pale creamy-yellow with grey-brown markings, and ventrally pale creamy-yellow; 1.52 × longer than broad; densely pilose. Two pairs of spinnerets; PMS unsegmented and separated by about the diameter of a spinneret; PLS 3-segmented and digitiform, with apical segment elongate.

Legs: uniformly pale yellow-brown; prolateral face of femur I same colour as other segments. Coxal cuspules absent. Scopula present on all tarsi, present distally on metatarsi I–III; tibia with numerous trichobothria in 2 rows; metatarsi with several trichobothria; tarsi with numerous trichobothria; claws with 2 rows of teeth; claw tufts absent. Dimensions (mm): Femur I 8.19/2.08, L/W 3.94; femur II 7.32; femur III 5.46; femur IV 8.48/2.48, L/W 3.42.

Pedipalp: tarsus densely setose.

Genitalia (Figure 29): with 1 pair of spermathecae, medially curved with bulbous spermathecae head.

Other material

AUSTRALIA: Western Australia: 1 juvenile, Kundip, 17.4 km SE. of Ravensthorpe, 33°40'50"S, 120°11'37"E, pitfall trap, 5 January 2004, R. Teale (WAM T64918); 1 ♂, Mt Cattlin, ca. 3 km N. of Ravensthorpe, 33°33'25"S, 120°02'29"E, pitfall trap, 22 October 2008, V. Saffer (WAM T132500); 1 ♂, 1 ♀, N. of Rollond Road, near junction with Neds Corner Road, 3, 33°15’28"S, 121°05’47"E, 15, pitfall trap, 15 October 1999–1 November 2000, P. van Heurck, et al. (WAM T147266); 1 ♂, Doyle Road, Munglinup, 33°46’25"S, 120°50’06, pitfall trap, 12 December 2001, A. Sanders (WAM T152619); 1 ♂, Fitzgerald River National Park, 9.5 km NW of Roes Rock, 33°56’20"S, 119°18’18"E, pitfall trap, 1 November 1996, A. Sanders (WAM T42340); 1 juvenile, 4.2 km SW. of Esperance, Blue Haven Beach, 33°53'13"S, 121°51'43"E, under rock, 28 November 2006, M.L. Moir, K.E.C. Brennan (WAM T78550); 1 juvenile, Kundip, 17.4 km SE. of Ravensthorpe, 33°40'50"S, 120°11'37"E, pitfall trap, 5 January 2004, R. Teale (WAM T64918);, Ravensthorpe Range North, 33°33'12.01"S, 120°07'12.04"E, ex burrow, 21 May 2007, M.C. Leng, M.L. Moir (WAM T80940); 1 ♂, Ravensthorpe Range North, 33°31'49.09"S, 120°05'51.06"E, ex burrow, 22 May 2007, M.C. Leng, M.L. Moir (WAM T80952); 1 juvenile, Ravensthorpe Range Middle, near townsite, 33°34'04.09"S, 120°02'51.05"E, ex burrow, 28 May 2007, M.C. Leng, M.L. Moir (WAM T81022); 1 ♂, Ravensthorpe Range South, 33°37'05.03"S, 120°07'50.07"E, ex burrow, 28 May 2007, M.C. Leng, M.L. Moir (WAM T81032); 1 ♂, Ravensthorpe Range North, 33°31'31.00"S, 120°04'03.00"E, ex burrow, 12 September 2007, M.C. Leng, J. Newell (WAM T81277).

Distribution

Proshermacha wilga has been primarily collected from the Ravensthorpe Range in southern Western Australia, but with outlying populations at Blue Haven Beach, near Esperance, Rollond Road, Munglinup, and Fitzgerald River National Park (Fig. 1).

Remarks

Proshermacha wilga is one of the first species of the genus to be described from both sexes, the other being *P. credo* (Wilson et al. 2023).

Etymology

Proshermacha wilga inhabits the traditional lands of the Kepa Kurl Wudjari people, whose country spreads roughly from Israelite Bay in the east to Starvation Bay in the west. In consultation with the Esperance Tjaltjraak Native Title Aboriginal Corporation (the representative body for the Kepa Kurl Wudjari people), its elders and rangers, the species epithet refers to wilgie, a word used by Wudjari people to describe red ochre. As with others in the genus, members of *Proshermacha wilga* feature a reddish colouration that resembles the traditional use of ochre as body paint among Wudjari people.

Acknowledgments

We thank the collectors of the specimens, as listed above. We also thank Mia Hillyer and Joel Huey, formerly of the Western Australian Museum, for supplying the sequence data used in this study, and Michael Rix (Queensland Museum) for assistance with the molecular analysis. Finally, we thank Donna Beach, co-author of this paper, Wudjari Elder, and Senior Ranger of the Esperance Tjaltjraak Native Title Aboriginal Corporation, who provided the name for this species, and who’s country, Kepa Kurl Wudjari, this species inhabits.

This study was supported by an Australian Government Research Training Program Scholarship awarded to the lead author by Curtin Univrisity as part of his doctroal studies, supervised by Matthew Chrulew and Tod Jones. It was also supported by the Esperance Tjaltjraak Native Title Aboriginal Corporation, and its Circle of Elders.

References

Castalanelli MA, Framenau VW, Huey JA, Hillyer MJ & Harvey MS (2020) New species of the open-holed trapdoor spider genus Aname (Araneae: Mygalomorphae:

Anamidae) from arid Western Australia. *Journal of Arachnology* 48:169–213.

Department of the Environment (2013) Australia's bioregions (IBRA). IBRA7, Commonwealth of Australia. http://www.environment.gov.au/land/nrs/science/ibra#ibra. Accessed 15 March 2022.

Harvey MS, Gruber K, Hillyer MJ & Huey JA (2020) Five new species of the open-holed trapdoor spider genus *Aname* (Araneae: Mygalomorphae: Anamidae) from Western Australia, with a revised generic placement for *Aname armigera*. *Records of the Western Australian Museum* 35:10–38.

Harvey MS, Hillyer MJ, Main BY, Moulds TA, Raven RJ, Rix MG, Vink CJ & Huey JA (2018) Phylogenetic relationships of the Australasian open-holed trapdoor spiders (Araneae: Mygalomorphae: Nemesiidae: Anaminae): multi-locus molecular analyses resolve the generic classification of a highly diverse lineage. *Zoological Journal of the Linnean Society* 184:407–452.

Huelsenbeck JP & Ronquist F (2001) MRBAYES: Bayesian inference of phylogeny. *Bioinformatics* **17**: 754–755.

Hogg HR (1901) On Australian and New Zealand spiders of the suborder Mygalomorphae. *Proceedings of the Zoological Society of London* 1901 (2):218–279.

Hogg HR (1902). On some additions to the Australian spiders of the suborder Mygalomorphae. *Proceedings of the Zoological Society of London* 1902 (2):121–142.

Huey JA, Rix MG, Wilson JD, Hillyer MJ & Harvey MS (2019) Open-holed trapdoor spiders of the genus *Teyl* (Mygalomorphae: Nemesiidae: Anamini) from Western Australia's Pilbara bioregion: a new species and expanded phylogenetic assessment. *Zootaxa* 4674:349–362.

Katoh K & Standley DM (2013) MAFFT multiple sequence alignment software Version 7: improvements in performance and usability. *Molecular Biology and Evolution* 30:772–780.

Main BY (1954) Spiders and Opiliones. Part 6 of the Archipelago of the Recherche. *Australian Geographical Society Reports* 1:37–53.

Main BY (1985). Mygalomorphae. In: D. W. Walton (ed.), *Zoological catalogue of Australia* 3:1–48. Australian Government Publishing Service: Canberra.

Main BY (2012) Description and biogeographic implications of a new species of the *Chenistonia maculata* group from south-western Western Australia and rediagnosis of *Chenistonia* (Araneae: Mygalomorphae: Nemesiidae). *Records of the Western Australian Museum* 27:176–181.

Miller MA, Pfeiffer W & Schwartz T (2010) Creating the CIPRES Science Gateway for inference of large phylogenetic trees. *Proceedings of the Gateway Computing Environments Workshop (GCE), New Orleans, LA, 14 Nov. 2010*: 1–8.

Rainbow WJ (1911) A census of Australian Araneidae. *Records of the Australian Museum* 9:107–319.

Rainbow WJ & Pulleine RH (1918) Australian trap-door spiders. *Records of the Australian Museum* 12:81–169.

Raven RJ (1981). A review of the Australian genera of the mygalomorph spider subfamily Diplurinae (Dipluridae: Chelicerata). *Australian Journal of Zoology* 29:321–363.

Raven RJ (1984). A revision of the *Aname maculata* species group (Dipluridae, Araneae) with notes on biogeography. *Journal of Arachnology* 12:177–193.

Raven RJ (1985). The spider infraorder Mygalomorphae (Araneae): cladistics and systematics. *Bulletin of the American Museum of Natural History* 182:1–180.

Raven RJ (2000). Taxonomica Araneae I: Barychelidae, Theraphosidae, Nemesiidae and Dipluridae (Araneae). *Memoirs of the Queensland Museum* 45:569–575.

Ronquist F & Huelsenbeck JP (2003) MRBAYES 3: Bayesian phylogenetic inference under mixed models. *Bioinformatics* **19**: 1572–1574.

Simon E (1908) Araneae, 1re partie. In: W. Michaelsen and R. Hartmeyer (eds), *Die Fauna Südwest-Australiens* 1: 359–446. Gustav Fischer: Jena.

Thackway R & Cresswell ID (1995) An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves. Version 4.0. Australian Nature Conservation Agency: Canberra.

Wilson JD, Rix MG & Harvey MS (2023). A new spider species of the genus Proshermacha (Mygalomorphae: Anamidae) from the Coolgardie and Murchison bioregions of Western Australia, collected on a Bush Blitz expedition. Australian Journal of Taxonomy 19: 1–7. doi: https://doi.org/10.54102/ajt.olxwd.

This paper was typeset using Prince

www.princexml.com